

WHAT IS CLAIMED IS:

1. An ophthalmic surgical microscope comprising:
 - at least one observation beam path for intersecting with a patient's eye being viewed through the microscope; and
 - 5 an apparatus for illumination of the patient's eye with illuminating light, wherein the apparatus includes means for selecting at least one of the spectral band, polarization, and phase of the illuminating light such that the illuminating light is reflected, absorbed, or scattered differently in different media of the patient's eye or at interfaces of different media of the patient's
 - 10 eye.
2. The ophthalmic surgical microscope as defined in Claim 1, further comprising:
 - a display for generating an optical display image in response to a driver signal received by the display;
 - a first deflection element arranged in the observation beam path for
 - 15 diverting illuminating light reflected from the patient's eye out of the observation beam path;
 - a sensor arranged to receive light diverted by the first deflection element, the sensor generating a sensor signal representative of the light received thereby;
 - 20 an evaluation unit connected to the sensor and to the display, the evaluation unit receiving and processing the sensor signal to provide a driver signal for the display, whereby the display generates an optical display image of the patient's eye; and
 - a second deflection element arranged in the observation beam path
 - 25 for reflecting the display image of the patient's eye into the observation beam path.

- 5 3. The ophthalmic surgical microscope as defined in Claim 2, wherein the ophthalmic surgical microscope is a stereomicroscope having a pair of observation beam paths, two of the first deflection element are provided and allocated one to each of the pair of observation beam paths, and two of the second deflection element are provided and allocated one to each of the pair of observation beam paths.
4. The ophthalmic surgical microscope as defined Claim 2, wherein the display generates a true-color image.
- 10 5. The ophthalmic surgical microscope as defined Claim 2, wherein the display generates a false-color image.
6. The ophthalmic surgical microscope as defined Claim 2, wherein the display generates a black-and-white image.
7. The ophthalmic surgical microscope as defined in Claim 1, wherein the apparatus for illumination of the patient's eye includes at least one light source emitting illuminating light characterized by a specified spectral band, polarization, and/or phase.
- 15 8. The ophthalmic surgical microscope as defined in Claim 1, wherein the apparatus for illumination of the patient's eye includes a light source and at least one filter selectably insertable after the light source for producing certain optical properties in the illuminating light.
- 20 9. The ophthalmic surgical microscope as defined in Claim 1, wherein the apparatus for illumination of the patient's eye includes a light source selected from the following group: coherent light source, incoherent light source, laser, diode, and lamp.

10. The ophthalmic surgical microscope as defined in Claim 2, further comprising a shutter in the observation beam path, the shutter being operable to selectively block direct observation light from the patient's eye.
- 5 11. The ophthalmic surgical microscope as defined in Claim 2, further comprising a shutter between the display and the second deflection element, the shutter being operable to selectively block the display image of the patient's eye.
- 10 12. The ophthalmic surgical microscope as defined in Claim 10, further comprising an additional shutter between the display and the second deflection element, the additional shutter being operable to selectively block the display image of the patient's eye.
13. The ophthalmic surgical microscope as defined in Claim 1, further comprising a filter selectably insertable into the observation beam path for visualization of the different media of the patient's eye.
- 15 14. The ophthalmic surgical microscope as defined in Claim 13, wherein the ophthalmic surgical microscope is a stereomicroscope having a pair of observation beam paths, and two filters are provided and allocated one to each of the pair of observation beam paths for visualization of the different media of the patient's eye